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ABSTRACT

This workbook was designed as an easy-to-read, slower-paced text for students who have learning, reading, and language problems. As one of five workbooks to aid low achievers in problem solving, it focuses on strategies for solving one step and multistep word problems in mathematics. Students use skills learned in the four previous workbooks in the series. A six step plan of action is stressed. Questions within the text repeatedly involve the students' attention, and their learning is checked and reviewed within each lesson. Word problem situations reflect mathematical problems that students might actually meet. Worksheets to accompany the workbook are available in the teacher's guide. The five units in the workbook are entitled: A Math Plan of Action, Putting Things Together, Finding Parts of Amounts, More Than One Step, and Some Special Kinds of Problems. A page on Math Plans of Action lists suggestions for solving one step and multistep problems. (MNS)

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MATH IN ACTION →

SOLVING Word Problems

ED276587

Susan D. Echaore
Winifred Ho Roderman

U.S. DEPARTMENT OF EDUCATION
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SOLVING WORD PROBLEMS

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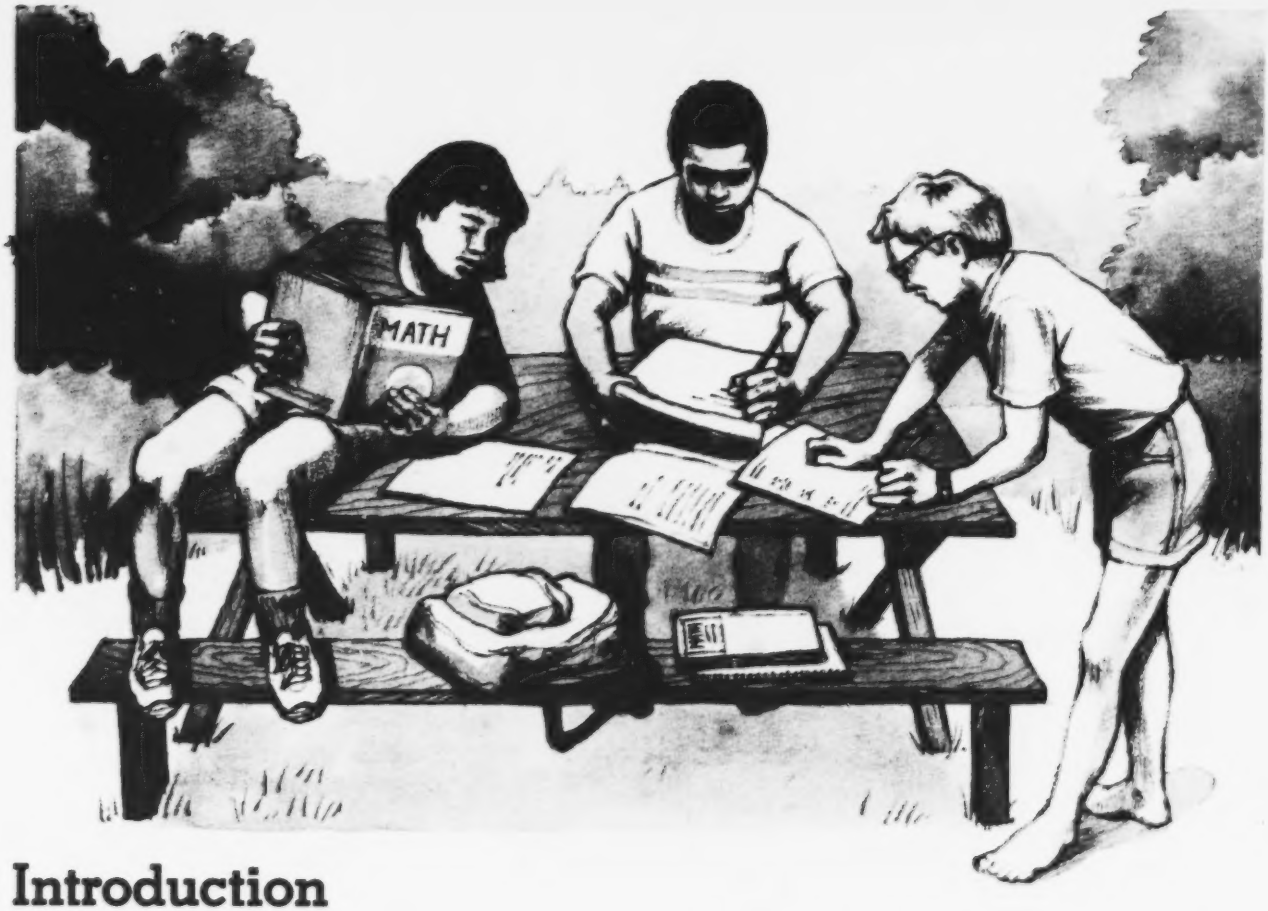


Introduction

Has this ever happened to you?

You and some other people are trying to solve a word problem. One person says to do one thing. Another person says to do something else. Nobody really knows what to do.

Word problems can give many people trouble. In fact, some people think those problems are the hardest kind of math to do. That's because they must think about many things in order to solve them. For instance: what the answer is about; what information they need; how they will get the answer; how they can know if the answer is right; and so on.

This book can help you handle word problems. You'll learn some strategies that will help you figure out what to do when you must solve a word problem. You'll also learn how to handle certain kinds of word problems. Those are problems you'll see all the time.

This book can help you solve math problems in real life too. That's because many word problems are about real-life math problems. For example, finding the new balance of a checking account is something you may do in real life. It is also something you may read about in word problems!

When you finish this book, you'll find it easier to solve word problems. You'll find it easier to solve real-life math problems, too!

Unit 1

A Math Plan of Action

Picture this:

You're playing football. Your team needs just one touchdown to win the game. But you and your teammates have a problem: The other team has the ball.

You and your teammates get in a huddle. Together, you come up with some *strategies* for getting the ball away from the other team. You decide *what* each of you will do. You decide *when* those things will happen. You decide *how* they will happen.

Your team is making a *plan of action*. That's a plan of things to do in order to solve a problem. Why is it a good idea to have a plan of action?

_____

_____

_____

_____

Now picture this:

You're working on a word problem. But you are stuck: You don't know what to do. A *plan of action* can help you solve that word problem.

Solving word problems can be like solving any other problem—for example, trying to make a touchdown. You will get what you want *faster* and *more easily* if you follow a plan of action.

When you make a plan of action, you decide on strategies that will get you what you want. You also decide which things to do first, second, and so forth.

Suppose you have to make a plan of action to solve a word problem. What strategies would you have in your plan?

_____

_____

_____

_____

A Math Plan of Action

- ☐ 1. Read the problem two times. Mark the words you don't know. Find out what they mean.
- ☐ 2. Draw a line under the sentence (the question) that tells you what answer to find.

What's It All About?

A word problem is a math problem told with words. You can't solve it if those words don't make sense. So your plan of action should first do this: make sure you understand the problem.

Here are some strategies that can help you understand the problem:

- First, read the word problem all the way through to get an idea of what it's about. Then read it slowly and look closely at the words. Put a mark above the words you don't know. Find out the meanings of those words.
- Next, look for the sentence that tells you what *answer* you must find. That sentence can be a question. Draw a line under that sentence (or question).

Now read this word problem. Follow those strategies. In the box at right, put an **X** in front of each strategy as you complete it. Then answer the questions.

> Tina has **$300** in her savings account. She deposits **$25**. What is her new balance?

1. What words did you mark? Write the words and their meanings.

_____

_____

_____

2. What answer does the question ask you to find? Write the question again in your own words.

_____

Getting Information

You're working on a word problem. You read it twice. You find the meanings of words you don't know. You underline the sentence that tells you what answer you must find. Now you must do this: Find the information you need in order to solve the problem.

Here are two more strategies to add to your plan of action. They help you find the right information.

- Put a ✓ above *clue words*. Clue words help you decide which facts to use and which operation to do.
- Circle the right *facts*. Those are the facts that help you answer the question. They should be about things and the number of those things.

Now read this word problem. Follow the four strategies you've learned so far. Put an **X** in front of each strategy as you complete it. Then answer the questions.

> Kenji is a waiter. His paycheck is $32 a day. He also gets tips. On Saturday, he makes $20 in tips. How much money does he make altogether that day?

1. What words did you mark? Write the words and their meanings.

_____

_____

_____

_____

_____

_____

_____

_____

A Math Plan of Action

- ☐ 1. Read the problem two times. Mark the words you don't know. Find out what they mean.
- ☐ 2. Draw a line under the sentence (the question) that tells you what answer to find.
- ☐ 3. Put a ✓ above clue words.
- ☐ 4. Circle the right facts.

2. What answer must you find?

_____

_____

3. What clue words did you put a ✓ above?

_____

_____

4. What facts did you circle?

_____

_____

Bonus: Find the answer to the problem. Use the space above.

Solving the Problem

Let's say you've found the information you need to solve a problem. You're now ready to find the answer to the problem. These two strategies can help you get the *right* answer:

- Choose the math operation that will solve the problem. Write the word problem as a math problem.
- *Estimate* what the answer should be. *Do* the math problem. Then *check* your answer.

Now solve this word problem. In the box to the right, put an **X** in front of each strategy as you complete it.

A Math Plan of Action

- ☐ 1. Read the word problem two times. Mark the words you don't know. Find out what they mean.
- ☐ 2. Draw a line under the sentence (the question) that tells you what answer to find.
- ☐ 3. Put a ✓ above clue words.
- ☐ 4. Circle the right facts.
- ☐ 5. Choose the math operation and write the math problem for the word problem.
- ☐ 6. Estimate the answer. Do the problem. Check your answer.

> Lin works as a messenger. She drives a truck. Today she makes **3** trips. She drives **12** miles on the first trip, **6** miles on the second trip, and **8** miles on the third trip. How many miles does she drive in all?

1. What words do you mark? Write the words and their meanings.

   _____

   _____

   _____

2. What answer must you find?

   _____

3. What clue words do you put a ✓ above?

   _____

4. What facts do you circle?

   _____

5. What math operation do you choose?

   _____

6. Write the math problem for the word problem. Estimate the answer. Do the problem. Then check your answer.

Estimate: _____	
Math Problem	*Answer Check*

Math Workout

You've learned six strategies that can help you solve word problems. What are they?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Now use the six strategies to do this problem.

Ben is shopping in a department store. He buys a toaster for **$15** and a blender for **$25**. He also buys a pot for **$12**. What is the total cost of the things he buys?

1. Write the words you marked. Then write their meanings.

   _____

   _____

2. What answer must you find?

   _____

3. What clue words did you put a ✓ above?

   _____

4. What facts did you circle?

   _____

5. What math operation do you choose?

   _____

6. Write the math problem for the word problem.
   Estimate the answer. Do the problem. Check your answer.

Estimate: _____

Math Problem	*Answer Check*

Unit 2

Putting Things Together

Picture this:

You are working on some math. You have six word problems to do. You feel *tired* when you think of having to solve *six* different word problems.

Then you look closely at the problems. You notice this: They are all the *same* kind of problem. They all ask you to find a *total* amount. All of a sudden, it's *easier* to do the problems.

To find a total amount, you do this: Put several amounts together. What math operation does that?

Did you say *add*? Or did you say *multiply*? Both are correct.

When you add, you put amounts together to get a total. When you multiply, you also put amounts together to get a total.

You solve many problems in real life by putting amounts together. For example, suppose you are shopping for food. You need to know how much everything will cost. So you put together the costs of everything you buy. And you get a total. What are some other real-life examples like that?

Counting Things

When you add, you count things to find out how many of them there are. You do that by putting *different* amounts together to get *one* total amount.

Many word problems ask you to put amounts together by adding. They ask questions such as:

- How many *miles* does he drive in all? (To get the answer, you'd put together the number of miles he drives.)
- How many *hours* does she work altogether? (You'd put together the number of hours she works.)
- What is their total cost? (You'd put together different prices.)

Look at the three questions again. What three clue words tell you to put things together?

_____

Now read these word problems. Then answer the questions. (The first is started as an example.)

1. Joe earned 50 credits as a freshman. He earned 45 credits as a sophomore. How many credits did he earn altogether?

   What do you put together to find the answer?

   50 credits and _____

2. Kay has a job as a kitchen helper. She peels 50 pounds of potatoes. Then she peels 30 pounds of carrots. Next, she washes 8 pounds of lettuce. How many pounds of vegetables does she *peel* in all?

   What do you put together to find the answer?

   _____

Look at this math problem. Write a word problem about it. Use the clue word *total*.

$21.75	three dinners	_____
6.45	three desserts	_____
1.00	two teas	
+ .50	one coffee	_____
----------	total	_____
		_____

Bonus: Find answers to all the problems on this page.

More Problems

You learned that many word problems ask you to add. Here is one kind that you'll often see.

Tomi has $600 in her account. Jan has $50 more.
How much does Jan have in her account?

Look at the clue word *more*. It tells you that Jan has $50 *and* another amount. What is that amount?

_____

Right! That amount is $600—that's the *same* amount that Tomi has.

What would you do to find out how much Jan has altogether in her account?

_____

Right again! You'd add $50 and $600. You'd put the two amounts together.

Now read this word problem and answer the questions.

Chita scores 235 points in a game. Rebel scores 86 points more. What is Rebel's score?

1. What amount is Chita's score?

   _____

2. What two amounts are in Rebel's score?

   _____

3. What would you do to find Rebel's total score?

   _____

Look at this math problem. Write a word problem about it. Use the clue word *more*.

4 feet (Myra's height)
+2 feet more
----- feet (Jack's height)

_____
_____
_____
_____
_____

Bonus: Find the answers to all the problems on this page.

Putting the Same Thing Together

Suppose you are solving this problem:

> Joe earns $4 an hour. He works 5 hours a day. How much does he earn in one day?

The problem asks you to find a total amount: how much money Joe makes by the end of a day.

How many hours does Joe work in one day?

_____

How much does Joe earn for one hour of work?

_____

How would you solve the problem?

_____

You solve the problem by putting together the money Joe makes each hour. He makes the *same* amount each hour. So, put that amount together like this: multiply it by the number of hours he works.

Here is another problem:

> Donna's car can go 23 miles on one gallon of gas. She has 10 gallons in the tank. How many miles can her car go on that tank of gas?

1. How many gallons of gas are in the tank?

   _____

2. What does the problem ask you to find?

   _____

3. How many miles can the car go on one gallon of gas?

   _____

4. What same amount do you multiply many times?

   _____

Look at this math problem. Write a word problem about it. Use the clue words *in all.*

$2.60	for each tape	_____
× 3	tapes	_____
.....	total cost	_____
		_____

Bonus: Find the answers to all the problems.

Math Workout

Follow the Math Plan of Action. Solve these word problems. Put an **X** in front of each strategy as you complete it. Show what you do in the space below each word problem.

1. You take a bus to and from work. Bus fare is $.60 a ride. You ride the bus 12 times a week. How much do you spend altogether?

Estimate: _____	
Math Problem	*Answer Check*

2. Anju works 37 hours this week. Pram works 12 hours more overtime. How many hours does Pram work?

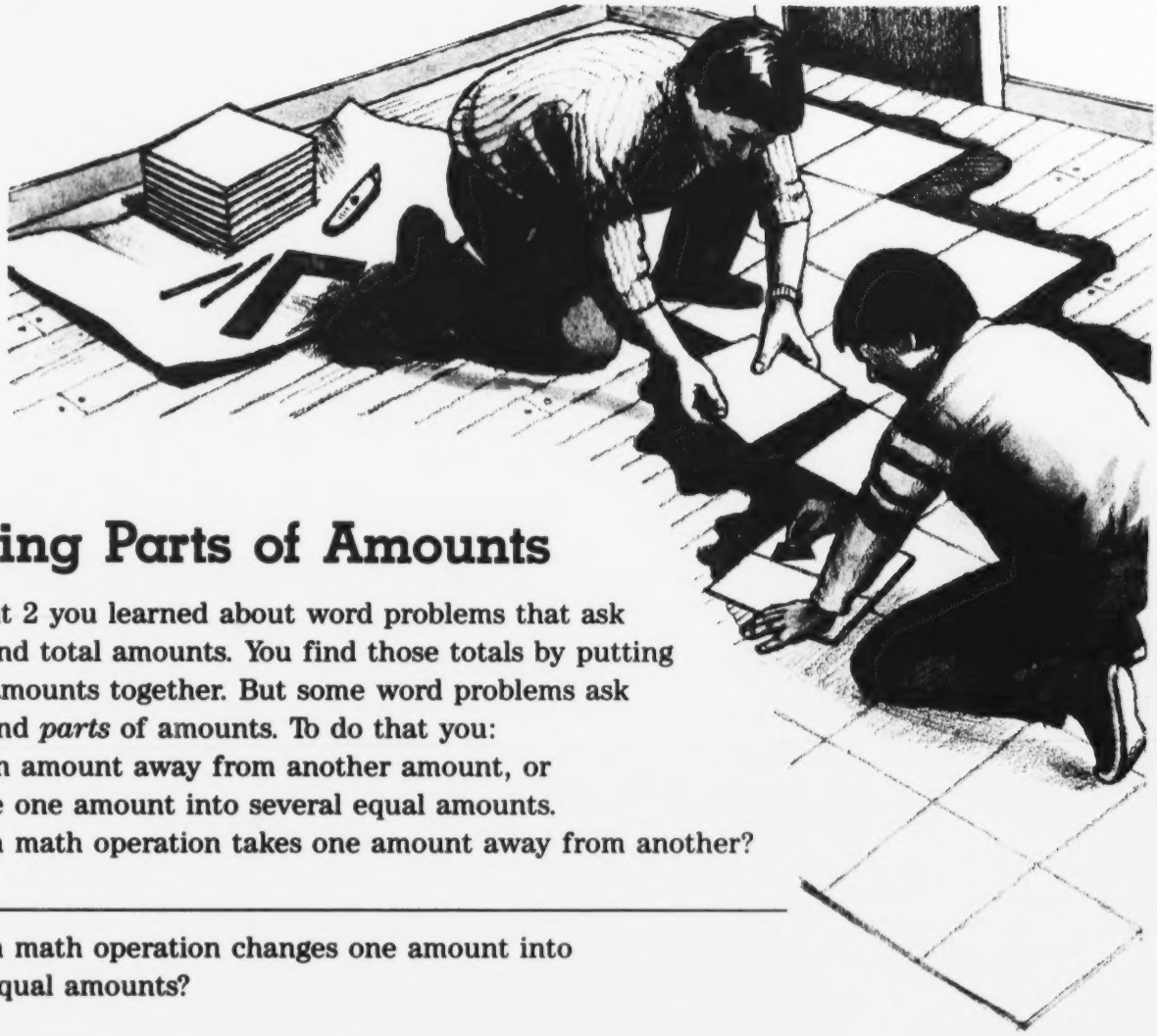
Estimate: _____	
Math Problem	*Answer Check*

A Math Plan of Action

- ☐ 1. Read the problem two times. Mark the words you don't know. Find out what they mean.
- ☐ 2. Draw a line under the sentence (the question) that tells you what answer to find.
- ☐ 3. Put a ✓ above clue words.
- ☐ 4. Circle the right facts.
- ☐ 5. Choose the math operation. Write the math problem.
- ☐ 6. Estimate the answer. Do the problem. Check your answer.

3. Bill and Vince play on the same basketball team. In the first half of the game, Bill scores 12 points. Vince scores 5 points. In the second half of the game, Bill scores 9 points. Vince scores 10 points. How many points in all does Bill score?

Estimate: _____	
Math Problem	*Answer Check*



Unit 3

Finding Parts of Amounts

In unit 2 you learned about word problems that ask you to find total amounts. You find those totals by putting smaller amounts together. But some word problems ask you to find *parts* of amounts. To do that you:

- take an amount away from another amount, or
- change one amount into several equal amounts.

Which math operation takes one amount away from another?

_____

Which math operation changes one amount into several equal amounts?

_____

When you *subtract*, you take one amount from another amount. And when you *divide*, you change one amount into several equal amounts.

You solve problems like that in real life, too. For example, you take an amount away from another amount when you pay for something and *get change*. What's another real-life example like that?

_____

_____

Now write a real-life example of this: when you change *one* amount into *several* equal amounts.

_____

_____

What's Left?

Many word problems ask you to find what's *left* of an amount after you take something away. What math operation would you do to solve those problems?

_____

Right! You'd subtract to solve those problems.

Read these word problems and answer the questions. (The first one is started.)

1. Chue earns **$300** a week. His boss takes out **$87** for taxes. How much does Chue take home in pay?

   a. What does the problem ask about Chue's pay?

   The problem asks what's left after Chue's boss takes out some money.

   b. What amount do you take away to solve the problem? _____

   c. What amount do you take it away from? _____

2. Lou gets a doctor bill for **$125**. Her insurance will pay only **$90** of that bill. Lou must pay the rest. How much does she pay?

   a. What does the problem ask about the bill? Use the word *left* in your answer.

   _____

   b. What amount do you take away to solve the problem? _____

   c. What amount do you take it away from? _____

Look at this math problem. Write a word problem about it. Use the clue word *left*.

```
  28 tickets
- 13 tickets
------ tickets
```

_____

_____

_____

_____

_____

Bonus: Find the answers to all the problems on this page.

What's the Difference?

What does this problem ask you to do?

> Lita wants to buy a house. The down payment is **$7,000**. Lita has **$3,582** in her savings. How much more money does she need?

This is a kind of problem you'll see often. It asks you to *compare* two amounts and to find the *difference* between them. That difference will show how much more the larger amount is *and* how much less the smaller amount is.

Look at the problem again. The larger amount is the down payment. What is the smaller amount?

_____

Right! The smaller amount is Lita's savings. What math operation would you do to find the difference between those two amounts?

_____

Right again! You'd *subtract*.

Now read this problem and answer the questions.

> Scott and Jackie pack boxes in a warehouse. Scott tries a new way to pack. He packs **31** boxes. Jackie packs the old way. He packs **27** boxes. How many fewer boxes does Jackie pack?

1. What two amounts do you compare? Finish the sentences.

   The number of _____

   And the number of _____

2. What will your answer show? Finish the sentences.

   How many fewer boxes _____

   How many more boxes _____

Now write a word problem about this math problem. Compare two amounts. Use the clue words *how many more* or *how many less*.

```
  43 hours
- 37 hours
-------- hours
```

_____

_____

_____

_____

_____

Bonus: Find the answers to all the problems on this page.

How Many Parts?

Many word problems ask how many equal parts are in a total. To solve them, you'd find how many times *one* of those parts goes into the total. What math operation would you do?

_____

Right! You'd *divide*.

Here's an example of those problems:

> Chi spends $3.60 to buy cheese. Cheese costs $1.20 a pound. How many pounds does Chi buy?

The problem asks how many *equal parts* (each pound) are in a *total* (all the cheese Chi buys). What cost stands for the total (all the cheese)?

_____

What cost stands for each equal part (each pound of cheese)?

_____

To solve the problem, you'd do this: Find how many times $1.20 goes into $3.60. In other words, you'd divide $3.60 by $1.20.

Now, write a word problem about this math problem.

... workdays
8 hours a day | 40 hours a week

_____

_____

_____

_____

_____

_____

How Many Things?

Sometimes word problems ask how many *things* are in each *equal part* of a total. To solve them, you'd divide the total by the *number* of parts in it. Here's an example of those kinds of problems:

> 42 kids go on a field trip. Their counselors divide them into 3 groups. Each group has the same number of kids. How many kids are in each group?

What is the total (all the kids)?

_____

How many equal parts (groups) are in that total?

_____

How would you solve the problem? Write the numbers where they belong.

Divide _____ by _____.

Now look at this math problem. Write a word problem about it. Use the clue words *costs the same*.

... cost of each can
3 cans | $6 total cost

_____

_____

_____

_____

_____

_____

Bonus: Find the answers to your word problems.

A Math Plan of Action

- ☐ 1. Read the problem two times. Mark the words you don't know. Find out what they mean.
- ☐ 2. Draw a line under the sentence (the question) that tells you what answer to find.
- ☐ 3. Put a ✓ above clue words.
- ☐ 4. Circle the right facts.
- ☐ 5. Choose the math operation. Write the math problem.
- ☐ 6. Estimate the answer. Do the problem. Check your answer.

Math Workout

Follow the Math Plan of Action. Solve these word problems. Put an X in front of each strategy as you complete it. Show what you do in the space below each word problem.

1. **Nita is an order entry clerk. She keys sales orders into a computer. She keys in 320 orders in 4 hours. How many orders does she key in each hour?**

Estimate: _____	
Math Problem	*Answer Check*

2. **Kimo shops for food. His bill is $26.82. He pays the clerk $40. How much change does he get back?**

Estimate: _____	
Math Problem	*Answer Check*

3. **A stereo in Radio Land costs $120. The same stereo costs $123 in the Buywise store. How much less is the stereo in Radio Land?**

Estimate: _____	
Math Problem	*Answer Check*

4. **The King Company has 3 work shifts. Each shift has the same number of workers. A total of 360 people work at the company. How many workers are in each shift?**

Estimate: _____	
Math Problem	*Answer Check*

Unit 4

More Than One Step

Picture this:

You are writing two checks: one for your rent and one for your phone bill. Now you will balance your checking account: you will figure how much money is left in it. What math operations would you do to figure that balance?

Here's how you'd figure the balance: First, you'd add together the amounts of the two checks. Next, you'd subtract the total of the two checks from the old balance. You'd do *two* math steps.

Most real-life math problems are like that: you must do more than one math step to solve them. Think of a time when you had to solve a real-life math problem with many steps. What was it?

What were the steps?

Many word problems are like real-life problems. Sometimes you must do more than one math step to solve them. How can you tell when they have just *one* step? How can you tell when they have *more* than one step?

What's Missing?

Here's how to tell if a word problem has many steps: Look at the facts. Word problems with many steps have *missing facts*. You must first find those facts before you can solve those problems.

The strategies at right can help you find missing facts. Read this two-step problem. Follow those strategies. Put an **X** in front of each strategy as you complete it.

> Doris buys (3) movie tickets. They (each cost $5). She pays the cashier ($20). How much change does Doris get back?

1. What math operations would you do to solve the problem?

   _____

2. What facts do you need? (One is given.)

   How much Doris pays.
   How _____

3. Which fact is missing?

   _____

   _____

4. How would you find that fact?

   _____

   _____

Look at the two steps below. Finish writing them.

Step 1	Step 2
$5 each ticket × 3 tickets ------ total cost	$20 Doris pays − .... total cost ------- change

A Math Plan of Action for Many-Step Problems

- ☐ 1. Read the word problem two times. Mark the words you don't know. Find out what they mean.
- ☐ 2. Draw a line under the sentence (the question) that tells you what answer to find.
- ☐ 3. Put a ✓ above clue words.
- ☐ 4. Circle the right facts.
- ☐ 5. Choose the math operation that will solve the word problem. Decide what facts you need. Then decide which facts are missing.
- ☐ 6. Decide what steps you must first do to find missing facts. Write those steps as math problems.
- ☐ 7. Estimate the answers to the steps. Do the problems. Check your answers.
- ☐ 8. Write the last step. Estimate the answer. Do the problem. Check your answer.

Bonus: Find the answer to the problem.

Changing Facts

Here is a kind of problem you'll often see:

> Kuni is fixing a lamp. He will buy electrical wire for it. He needs 36 inches of wire. Wire costs $.60 a foot. How much will he spend altogether for it?

To solve the problem, you'd *multiply*. You'd multiply the *cost* of the wire with the *amount* Kuni needs. But before you can do that, you must do another step first. What is it?

_____

Right! You must change 36 *inches* into *feet*. Why must you do that?

_____

In the boxes, finish writing the two steps for the problem.

Problems that have more than one step are often like that problem. They have all the facts you need to solve them. But you must *change* some of the facts before you can use them.

Here's another problem like that:

> Joline wins a 2 week trip to Hawaii. She gets $50 a day as spending money. How much spending money does she get in all?

1. What answer does the problem ask you to find?

_____

2. What operation would you do to get that answer?

_____

3. What fact must you *first* change? Why?

_____

_____

4. What operation will you do to change it?

_____

Now write the two steps for the problem.

Bonus: Find answers to all the problems.

Step 1: Change the fact.

(Remember: There are 12 inches in a foot.)

```
   ---- feet
12 | 36 inches
```

Step 2: Solve the problem.

```
   ----- feet
x $.60   per foot
-------
   ------- total cost
```

Step 1: Change the fact.

Step 2: Solve the problem.

State 6½% Sales Tax Schedule			
Amounts	Tax	Amounts	Tax
$28.39 to $28.53	$1.85	$39.77 to $39.92	$2.59
$28.54 to $28.69	$1.86	$39.93 to $40.07	$2.60
$28.70 to $28.84	$1.87	$40.08 to $40.23	$2.61

Looking for Facts

Sometimes you must solve a word problem that *won't* have all the facts. You must find the fact you need in a picture, chart, or graph. Here's a problem like that:

> Jo is a sales person. She is finding the total of a customer's bill. He is buying two items: one for $12.50 and the other for $16.30. Jo must add a sales tax to the bill. What will the total cost be?

The problem asks you to find the total amount of the bill. What facts in the word problem can help you find the answer?

_____

Now look at the chart. It has a fact you need. What is it?

_____

What two steps would you do to solve the problem?

Step 1: _____

_____

Step 2: _____

_____

Right! For step 1, add the two items to get their total. For step 2, find the sales tax on the chart, then add it to the total.

Now read this problem. Write what you'll do in each step. Then show the math for each step.

> K.C. buys a shirt for $12 and a pair of pants for $20. She also buys a belt for $8. She must pay a sales tax. How much will she pay altogether?

Step 1: _____

Step 2: _____

Bonus: Find answers to the two problems on this page.

Check Yourself

When you work on a word problem, it's easy to make a mistake. So your plan of action should have strategies that help you *check yourself*.

It's especially easy to make mistakes when you do problems with many steps. That's why it's a good idea to check yourself as you do each step.

Here are some strategies to follow as you do each step:

- First, *estimate the answer*. That gives you an idea of what the right answer should be. Then if you make a mistake, you can see it more easily.
- Next, do the math. Then, check your *answer*. If the answer doesn't check out, go over the math again. Did you copy the numbers correctly? Did you do the math operation in the right way?

Now solve this three-step problem. Follow the directions for each step. First, estimate an answer for the step. Then, write the math problem for the step and find the answer. Next, check your answer. Show how you check it.

Enna, Pilar, and Renee are moving into an apartment. They will share these costs equally: a security fee for the apartment, and the cost for renting a truck. The fee is **$300**. The truck costs **$45** a day. They will rent it for **2** days. How much will each person pay?

Step 1: Find the cost of the truck.
Estimate: _____

Math Problem	*Answer Check*

Step 2: Find the total cost of everything.
Estimate: _____

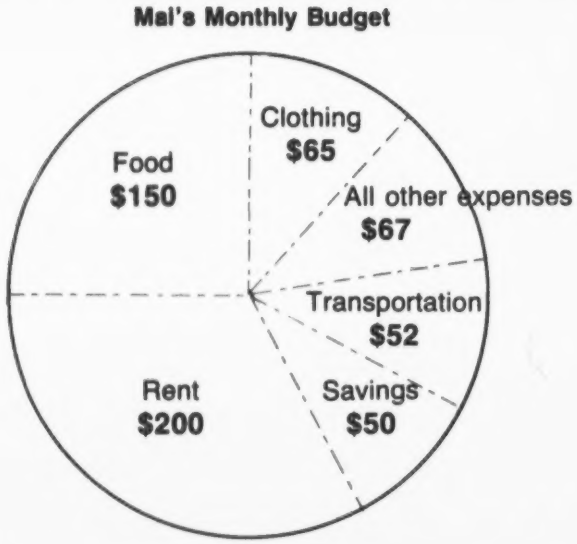
Math Problem	*Answer Check*

Step 3: Find the cost for each person.
Estimate: _____

Math Problem	*Answer Check*

Math Workout

Follow the Math Plan of Action to solve these word problems. (If you can't remember all the strategies, look on page 31.) Some facts you need are in the pie-shaped graph. Write what you'll do in each step. (The first is done.)



1. Mai's net pay is $7,008 a year. She makes a budget of what she can spend each month. How much a year can she spend altogether on food, rent, and transportation?

Step 1: *Find the monthly total.* Estimate: _____	
Math Problem	*Answer Check*

Step 2: _____ Estimate: _____	
Math Problem	*Answer Check*

2. Mai gets paid every two weeks. About how much a week can she spend altogether on clothes and other expenses? (Figure 4 weeks a month.)

Step 1: _____ Estimate: _____	
Math Problem	*Answer Check*

Step 2: _____ Estimate: _____	
Math Problem	*Answer Check*

Bonus: Use another sheet of paper. Write a two-step word problem for these math steps. **Step 1:** 5 boxes × 12 pencils = ... total pencils **Step 2:** ..... total pencils − 27 pencils = ... pencils left

Unit 5

Some Special Kinds of Problems

Picture this:

You're shopping for a coat. You see this sign: *15% off regular price*. The regular price is $87. How would you figure the sale price?

_____

_____

If you think you know how to figure the sale price, show the math in the space at right. Then check your answer. (The right answer is at the bottom of the page.)

Many word problems are about real-life problems such as finding a sale price after a percent is taken off. Those kinds of problems are *trouble* for many people. Here are some other kinds of problems that are trouble:

- Finding an amount after interest is added.
- Finding what something actually costs.
- Finding an average of several amounts.

Which kinds of problems are trouble for you?

_____

_____

Which kinds can you handle easily?

_____

_____

Answer: The sale price is $73.95.

Finding a Reduced Amount

Look at the ad. What does it tell you about the price of shoes?

_____

Right! The price is *reduced*. It is 40% less. In other words, 40% of the price is *taken off* the regular price.

How much do the shoes usually cost?

_____

How much do you think the reduced price is? Make an estimate.

_____

Many word problems are about amounts like that. The amounts are reduced by a certain percent. And the problems ask you to find the reduced amounts. Here's how to solve those kinds of problems. Follow these steps—and find the reduced price of the shoes in the ad.

Step 1: Change the percent to a decimal.

To do that, drop the percent sign. Put in the decimal point where it belongs.

40% ⟶ .40

Step 2: Find the amount taken off.

To do that, multiply the *total amount* by the *decimal*.

$26. total amount
× .40
------- amount taken off

Step 3: Find the reduced amount.

To do that, subtract the *amount* taken off from the *total amount*.

$26.00 total amount
−------- amount taken off
--------- reduced amount

Now follow the steps and do this problem. Find the reduced number of orders.

> The clerks in a company usually type 500 sales orders a day. This week they are typing 12% fewer orders a day. How many sales orders are they typing a day?

Step 1: Change the percent to a decimal.

-------- ⟶ --------

Step 2: Find the amount taken off.

Step 3: Find the reduced amount.

Answers: The reduced price of shoes is $15.60.
The reduced number of orders is 440.

Finding an Increased Amount

You'll often see this kind of word problem:

> Mavis borrows $900 from a bank. The bank charges her a 15% interest rate on the loan. How much will Mavis pay back altogether?

Mavis borrows money with *interest*. She must pay back that money *plus* a percent of that money.

How much does Mavis borrow?

_____

What percent must she add to her loan?

_____

How much will she pay back altogether? Make an estimate.

_____

Many word problems are about an amount that *increases* by a certain percent. You must find the increased amount. These steps show how to solve those kinds of problems. Follow these steps—and find out how much Mavis will pay.

Step 1: Change the percent to a decimal.

15% ⟶ .....

Step 2: Find the amount that's added.

$ ..... total amount

× .....

.....

.....

..... amount added

Step 3: Find the increased amount

$ ..... total amount

\+ ..... amount added

..... increased amount

Now solve this problem. Follow the steps and find the increased amount.

> Drew School has 1,680 students at the beginning of the year. By the middle of the year, it has 30% more students. How many students does it now have?

Step 1: Change the percent.

..... ⟶ .....

Step 2: Find the amount that's added.

Step 3: Find the increased amount.

Answers: Mavis pays back $1,035.
Drew School now has 2,184 students.

What's the Real Cost?

Here's another kind of word problem about percents and interest. It's also a kind of problem you may have to solve in real life:

> Lee wants a new car. Its price is $8,000. Lee doesn't have that much money. A car dealer will sell Lee the car on these terms: 10% down and $180 a month for 48 months. How much would Lee pay altogether?

How much do you think the car would really cost Lee: $8,000? Less than $8,000? More than $8,000?

The car would cost *more* than $8,000. Here's why: Lee would first make a large down payment. Then he'd make small payments every month for 4 years. He would be ***buying on time***. That's another way to borrow money. Lee would have to pay an interest for borrowing that money.

This is how to solve those kinds of problems. Follow the steps—and find the real cost of the car.

Step 1: Change the percent to a decimal.

10% ⟶ .....

Step 2: Find the down payment. (Find 10% of $8,000.)

$ ..... price of car

× .....

----- down payment

Step 3: Find the total of *all monthly* payments.

$ ..... a month

× ..... months

----- total monthly payments

Step 4: Find the real cost. To do that, add the total monthly payments and the down payment.

$ ..... total monthly payments

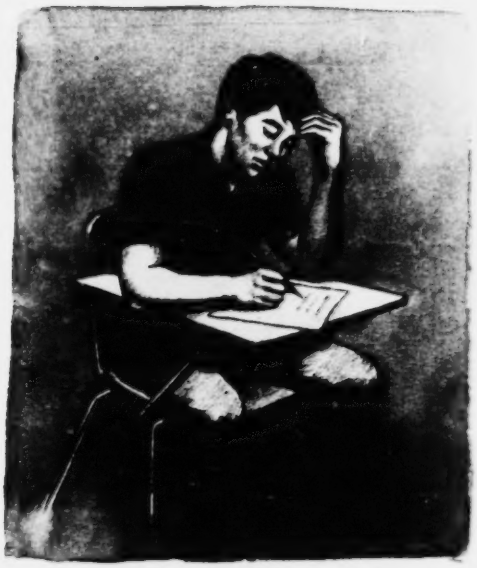
\+ ..... down payment

----- real cost

Answer: The real cost is $9,440.

Bonus: See if you can figure how to find these answers:

1. How much higher than the price is the real cost?
2. What is the rate of interest for buying the car on time?



Finding an Average

Many word problems ask you to find an average of several amounts. (An average is a number that's about in the middle of a group of numbers.) For example, **5** is the average of this group of numbers: **2, 4, 6, 8**. Do you know how to find an average? If you do, write the math that shows **5** is the average of those numbers.

Here's how you find an average:

Step 1: Add the amounts and get their sum. **(2 + 4 + 6 + 8 = 20)**

Step 2: Count up the amounts to find how many there are. **(4)**

Step 3: Divide the *sum* of the amounts by the *number* of the amounts. The answer is the average. **(20 ÷ 4 = 5)**

Read this word problem. Show the math for each step.

Del scores **81%** on his first math test. He scores **60%** on his second math test. Then he scores **90%** on his third test. What is his average math score?

Step 1: Find the sum of the scores.

Estimate: _____

Math Problem	*Answer Check*

Step 2: Count the number of scores.

How many scores are there? _____

Step 3: Find the average.

Estimate: _____

Math Problem	*Answer Check*

Now write a word problem about these math facts: **14 hours, 10 hours, 9 hours.** Use the clue word *average*.

_____

_____

_____

_____

_____

_____

Math Workout

Follow the math plan of action and solve these many-step problems. (If you can't remember all the strategies, look on page 31.) Use the space at right.

1. A business employs 1,200 workers. It lays off 30% of those workers. How many workers does the business now employ?

2. Frank takes his parents to dinner. The bill comes to $32. He gives the waiter a 15% tip. How much does Frank pay in all?

3. Larry sees a gold watch on sale. It costs $190. He can pay for the watch this way: He can put 20% down, and pay $14.99 per month for 12 months. How much would Larry pay altogether?

4. Zaidy works as a temporary office clerk. She earned these amounts from April to July: April—$850, May—$1,200, June—$950, and July—$825. What is her average monthly earnings?

Math Plans of Action

These strategies can help you solve one-step and many-step word problems.

One-Step Word Problems

- ☐ 1. Read the word problem two times. Mark the words you don't know. Find out what they mean.
- ☐ 2. Draw a line under the sentence (the question) that tells you what answer to find.
- ☐ 3. Put a ✔ above the clue words.
- ☐ 4. Circle the right facts.
- ☐ 5. Choose the math operation and write the math problem for the word problem.
- ☐ 6. Estimate the answer. Do the problem. Check your answer.

Many-Step Word Problems

- ☐ 1. Read the word problem two times. Mark the words you don't know. Find out what they mean.
- ☐ 2. Draw a line under the sentence (the question) that tells you what answer to find.
- ☐ 3. Put a ✔ above the clue words.
- ☐ 4. Circle the right facts.
- ☐ 5. Choose the math operation that will solve the word problem. Decide what facts you need for that operation.
- ☐ 6. Decide what steps you must first do to find missing facts. Write those steps as math problems.
- ☐ 7. Estimate the answers to the first steps. Do the problems. Check your answers.
- ☐ 8. Write the math problem for the last step. Estimate the answer. Do the problem. Check your answer.

Congratulations!

You've learned certain strategies for solving word problems.

You've learned ways to solve:

- one-step word problems,
- many-step word problems,
- and special kinds of word problems.

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